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PATENT CLAIMS

1.   Wood-polymer composite, characterized by wood impregnated with
polymerizable monomers selected from a group consisting of styrene,
methylstyrene and tertiary butylstyrene, initiated with at least three initiators;
5   crosslinked with divinyl benzene, ethylene glycol dimethacrylate, 1,3-butylene
glycol dimethacrylate, ethylene glycol trimethacrylate or trimethylol propane
trimethacrylate and containing oil or wax as a polymerization moderator and water
repellent for the finished product.

2.   Wood-polymer composite according to claim 1,
10   characterized in that said monomers are styrene, para-methyl styrene, tertiary
butylstyrene and combinations thereof.

3.   Wood-polymer composite according to claim 1,
characterized in that said initiators are selected in the following manner: at least
one initiator is selected from a low temperature class initiator of 2,2'-azobis (2-
15   methyl-butanenitrile), benzoyl peroxide, 2,2'-azobis (2,4-dimethyl-pentanenitrile),
2,2'-azobis (2-methyl-propanenitrile); at least one initiator is selected from a
medium temperature class initiator of 1,1'-azobis (cyclohexane-carbonitrile) and
1,1'-azobis (cyanocyclohexane-carbonitrile); and at least one initiator is selected
from a high temperature class initiator of tertiary butyl perbenzoate and di-tertiary
20   butyl peroxide.

4.   Wood-polymer composite according to claim 1,
characterized in that said polymerizable monomers presented as polymerized
monomers are distributed throughout the whole of said composite, or within a shell
below the exterior surfaces and ends 2 mm deep and deeper.

25   5.   Wood-polymer composite according to any of the preceding claims,
characterized in that said composite containing said polymerized monomers has a
density of from about 0,8 g/cc to about 1,2 g/cc.

6.   Wood-polymer composite according to any of the preceding claims,
characterized in that said composite untreated with said polymerizable monomers
30   has an average moisture content from about 3 to about 90%, and the moisture
content of said composite treated with said polymerizable monomers is from about
0 to about 50%.

7.   Wood-polymer composite according to any of the preceding claims,
characterized in that said composite is a round, sawn or laminated wood product.

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8.   Wood-polymer composite according to claim 7,
characterized in that said wood product is a railway sleeper, especially an
environmentally-friendly railway sleeper.

9.   Wood-polymer composite according to claim 7,
5   characterized in that said wood product is a pole, especially an environmentally-
friendly pole.

10. Method for preparing a wood-polymer composite by impregnating wood
material and/or wood-based material,
characterized by the steps of:
10   utilizing said wood material having a moisture content of from about 15 to
about 35% based on the weight of said wood material; impregnating said wood
material with a composition selected from a group consisting of polymerizable
monomers, a crosslinker and at least three initiators by means of vacuum and/or
pressure; and curing said impregnated wood material in a hot air oven, steam or hot
15   oil by means of a temperature sufficient to achieve the desired polymer loading.

11. Method according to claim 10,
characterized in that said moisture content is about 25%.

12. Method according to claim 10,
characterized in that said temperature of said hot air oven is from about 70 to about
20   140°C, preferably the temperature is about 70°C.

13. Method according to claim 10,
characterized in that said polymerizable monomers are selected from the group
consisting of styrene, methylstyrene and tertiary butylstyrene. ·

14. Method according to claim 10,
25   characterized in that said crosslinker is divinyl benzene, ethylene glycol
dimethacrylate, 1,3-butylene glycol dimethacrylate, ethylene glycol
trimethacrylate, or trimethylol propane trimethacrylate.

15. Method according to claim 10,
characterized in that impregnation is initiated with three initiators selected from
30   low, medium and high temperature classes, wherein at least one initiator is selected
from a low temperature class initiator of 2,2'-azobis (2-methyl-butanenitrile),
benzoyl peroxide, 2,2'-azobis (2,4-dimethyl-pentanenitrile), 2,2'-azobis (2-methyl-
propanenitrile), wherein at least one initiator is selected from a medium
temperature class initiator of 1,1'-azobis (cyclohexane-carbonitrile) and 1,1'-azobis
35   (cyanocyclohexane-carbonitrile), and wherein at least one initiator is selected from

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an initiator of high temperature class of tertiary butyl perbenzoate and di-tertiary butyl peroxide.

16. Method according to claim 10,
characterized in that time of impregnation is from about 15 to about 45 minutes.

5   17. Method according to claim 10,
characterized in that time of curing is from about 2 to about 12 h.

18. Method according to claim 17,
characterized in that time of curing is about 8 h.

19. Use of wood-polymer composite according to any of claims 1 to 9 or as
10   manufactured according to any of claims 10 to 18, as a doorstep, doorlaminate, floor, handle, building board, pallet, acoustic wood, outdoor furniture, indoor furniture, container floor, play apparatus, benchtop, outdoor deck material, stair and railing material, fence stakes, or timber.

20. Use according to claim 19, wherein the timber is a railway sleeper, especially
15   an environmentally-friendly railway sleeper.

21. Use according to claim 20, wherein the timber is a pole, especially an environmentally-friendly pole.